

3. AFFECTED ENVIRONMENT

The following sections update information found in the “Affected Environment” section of the EA prepared in 1997 for the lease of land and facilities within ETTP (DOE 1997). For certain resources, the affected environmental information presented in the 1997 EA is still valid and has not substantially changed. For this reason, the following resources are not addressed in this section: geology and soils, climate, cultural resources, radiation and chemical exposures, and accidents.

3.1 LAND USE

The ETTP geographic area of responsibility consists of approximately 5000 acres. Areas that have been potentially impacted in the past account for roughly 2200 of the 5000 acres. As part of the cleanup of ETTP, DOE’s Environmental Management (EM) Program has divided the potentially impacted area of ETTP into two areas: outside the main fence (Zone 1 – 1400 acres) and inside the main fence (Zone 2 – 800 acres). Historically, Zone 1 was used for light industrial purposes and has some open areas, with waste disposal. Zone 2 is the main plant area and has historically had a heavy industrial use.

Major changes to the land use within ETTP have not occurred since the 1997 EA. The ETTP mission has been to remediate the site, as well as reindustrialize and reuse site assets through leasing of underutilized facilities. CROET continues to lease and sublease portions of ETTP to various businesses and industries. Including CROET, approximately 40 companies are currently leasing facilities at ETTP.

Recent EM Program projects at ETTP have included both remedial action and decontamination and decommissioning activities (DOE 2002b). Remedial action projects typically address contaminant releases to the environment by addressing contaminated soil, water, sediment, or biota. Decontamination and decommissioning projects address contamination in facilities and structures and can also include demolition.

Major remedial actions that have occurred since 1997 include the following:

- K-1070-A Burial Ground (excavation of contaminated soil and waste deposited in trenches and pits),
- K-1070-C/D G-Pit and K-1071 Concrete Pad (excavation and low-temperature thermal desorption treatment of contaminated G-Pit soils and soil cover over concrete pad), and
- K-1085 Old Firehouse Burn Area Drum Burial Site (excavation of waste drums and contaminated soil)
- Demolition of buildings (K-724, K-725, K-1001, K-1031, K-1045, K-1045-A, K-1131, K-1300, K-1301, K-1302, K-1303, K-1404, K-1407, K-1408, K-1410, and K-1413); and
- K-29, K-31, and K-33 Equipment Removal and Building Decontamination (ongoing).

Six additional areas of ETTP that were inadvertently not included in the 1997 EA are also included in this proposed action ([Fig. 1.1](#)). These areas primarily consist of roads, grounds, and other infrastructure that have been leased primarily for maintenance purposes (e.g., mowing) and utility operations. Brief descriptions of the areas follow.

Area 1. Approximately 56 acres of roads and grounds are associated with the K-1515 Water Treatment Plant area including Water Tank Road on Pine Ridge. The K-1515 area is located near the west end of

Bear Creek Road. Water Tank Road is a loop road that runs from Bear Creek Road (near K-1515) to the water tanks on Pine Ridge and back down to South First Avenue. The grounds are located within a fenced area surrounding the K-1515 Water Treatment Plant and are mostly mowed lawn areas. This area has been leased to CROET. Operations Management International (OMI) has a contract with Heritage Center LLC to maintain this area and to operate the water treatment plant.

Area 2. A 134-acre area is located south of the old Powerhouse Area and bordered by the Clinch River, State Route 58, and the railroad along Powerhouse Road. Historically, portions of the area were used for coal storage. In addition, a material yard and the K-720 fly ash disposal area were in this location. This area is no longer used and no structures remain. The area currently contains old roads and power line right-of-ways. Habitat within the area includes a backwater area of Poplar Creek, wetlands, open areas of fields, and small areas of pines and hardwoods. Much of the area is also located within the floodplain of the Clinch River. This area is leased to Heritage Center LLC whose contractor OMI maintains portions of it (e.g., mowing).

Area 3. This is a 10-acre area bordered by Burchfield Road, Poplar Creek, and the railroad used from 1943 to 1958 by the Southern Railway Company as a maintenance area for locomotives and a storage yard for railroad equipment and materials. All the buildings in this area have been removed and only a few concrete pads remain. Old rails, ties, and associated hardware (metal plates, rail spikes, bolts, etc.) are present in weed-covered gravel areas in the vicinity of the old rail spur. A small wooded hill covered with a mix of small hardwood trees and pines is located north of the rail yard. The Southern Appalachia Railway Museum and East Tennessee Rail Car are currently subleasing a portion of this area for railroad related activities.

Area 4. Approximately 14 acres of land are located along State Route 58 and bordered by the fence located along the South East Patrol Road and Boulevard Road. The area surrounds the K-1330 facility and includes mowed lawn and the K-1240 parking lot. The K-1007-P5 Pond is located in the southwest corner of the area. OMI has a contract with Heritage Center LLC to maintain these grounds.

Area 5. Approximately 23 acres of land are located south of the K-901-A Pond. The majority of the area is part of the K-901-Waste Disposal Area. The area also contains a portion of Gilliam Road and the Patrol Road to the Duct Island area. Poplar Creek bounds the area on the south and the railroad bounds the area to the east. A large power line right-of-way runs through the western portion of the area. OMI, under contract with Heritage Center LLC maintains much of the area through periodic mowing but some hardwoods and pines are also present.

Area 6. A 43-acre area of land is located on the south side of Blair Road (State Route 327). The main portion of the area is located across from the entrance to the Blair Road Quarry and adjacent to Ellis Cemetery. A small area also runs along the road south to the road leading into Portal 6. The larger portion consists of areas that are periodically mowed and of pine trees that are affected by the Southern pine beetle infestation. The smaller portion consists mainly of mowed right-of-way along Blair Road. OMI mows the area under contract to Heritage Center LLC.

3.2 AIR QUALITY

The ORR and surrounding area continue to be classified as an attainment area for the National Ambient Air Quality Standards. The state of Tennessee has adopted these national standards, and the Tennessee Department of Environment and Conservation (TDEC) has also adopted regulations to guide the evaluation of hazardous air pollutants and toxics to specify permissible short- and long-term concentrations.

The TDEC Division of Air Pollution Control issues air permits for nonradiological airborne emissions for ETTP. ETTP has eight major air emission sources subject to Tennessee Title V Major Source Operating Permit program rules. No direct monitoring of airborne emissions is required for nonradionuclide air contaminants from permitted sources. Instead, monitoring of key process and air pollution control device parameters is done to ensure compliance with all permitted emission limits. The major sources of criteria air pollutants at ETTP include three boilers in operation at the K-1501 Steam Plant and the Toxic Substances Control Act of 1976 (TSCA) incinerator. Actual nonradiological airborne emissions of criteria pollutants from ETTP have consistently been lower than the allowable limits (DOE 2002b).

For radiological pollutants, emissions are variable and from ETTP emanate mostly from the TSCA incinerator and two sources (decontamination and decommissioning workshop and supercompactor) in the K-33 building. In 2001, the emissions of radionuclides from ETTP operations were well within the allowable derived concentration guides (DCGs) published in DOE Order 5400.5, and were similar in most respects to 2000 emissions (DOE 2002b).

3.3 WATER RESOURCES

Surface water monitoring is conducted at seven locations at ETTP. Two locations are upstream of ETTP, two are located downstream, and the remaining sampling locations are at points where drainage in the major surface water basins converge before discharging to Poplar Creek or to the Clinch River. At most stations, semiannual sampling and analyses for radionuclides and field readings (dissolved oxygen, temperature, and pH) are conducted. At a few stations, samples are also analyzed for volatile organic compounds (VOCs) and selected metals (DOE 2002b).

Most of the results of the monitoring for nonradiological parameters are well within the applicable standards or below detection limits. In addition, analytical results for samples collected upstream of ETTP, are chemically similar in most respects to those collected below ETTP. Non-radiological results are compared with Tennessee water quality standards for fish and aquatic life. Radionuclide results are compared with DCGs. The sum of the fractions of the DCGs for all sampling locations remained below 4% of the DCG values for ingestion, which are the equivalent to the DOE drinking water systems criterion of 4 mrem/year (DOE 2002b).

Groundwater monitoring at ETTP is focused primarily on investigating and characterizing sites for remediation under CERCLA. The ETTP Groundwater Protection Program requirements are incorporated into the Water Resources Restoration Program. The program is responsible for conducting groundwater monitoring at ETTP, including collecting samples from exit pathway monitoring wells. Groundwater monitoring at ETTP exit point locations during Fiscal Year (FY) 2002 revealed little changes from previous monitoring results. In general, areas of known groundwater contamination continue to exhibit concentrations similar to historical results and no new releases of contamination were identified. A general trend at most of the monitoring wells sampled during FY 2002 indicates that overall concentrations of VOCs in groundwater appear to be decreasing (DOE 2002c).

3.4 ECOLOGICAL RESOURCES

An updated list of animal species of concern known to be present on the ORR is presented, along with their status, in [Table 3.1](#). Listed plant species that currently occur on the ORR are given, along with their status, in [Table 3.2](#).

Table 3.1. Animal species of concern reported from the ORR^a

Species	Legal status ^b	
	Federal	State
<i>Fish</i>		
Spotfin chub (<i>Cyprinella monacha</i>)	T	
Tennessee dace (<i>Phoxinus tennesseensis</i>)		NM
<i>Amphibians and reptiles</i>		
Four-toed salamander (<i>Hemidactylium scutatum</i>)		NM
<i>Birds</i>		
Sharp-shinned hawk (<i>Accipiter striatus</i>)		NM
Anhinga (<i>Anhinga anhinga</i>)		NM
Great egret (<i>Casmerodius alba</i>)		NM
Northern harrier (<i>Circus cyaneus</i>)		NM
Olive-sided flycatcher (<i>Contopus borealis</i>)		NM
Cerulean warbler (<i>Dendroica cerulea</i>)	C	NM
Snowy egret (<i>Egretta thula</i>)		NM
Peregrine falcon (<i>Falco peregrinus</i> ^c)		E
Bald eagle (<i>Haliaeetus leucocephalus</i> ^d)	T	NM
Loggerhead shrike (<i>Lanius ludovicianus</i>)		NM
Osprey (<i>Pandion haliaetus</i>)		E
Yellow-bellied sapsucker (<i>Sphyrapicus varius</i>)		NM
<i>Mammals</i>		
Gray bat (<i>Myotis grisescens</i>)	E	E
Southeastern shrew (<i>Sorex longirostris</i>)		NM

^aLand and surface waters of the Oak Ridge Reservation (ORR) exclusive of the Clinch River, which borders the ORR.

^bE = endangered, T = threatened, C = species of concern, NM = in need of management.

^cThe Peregrine falcon was federally delisted on August 25, 1999.

^dThe Bald eagle was proposed for federal delisting on July 6, 1999.

Table 3.2. Currently known or previously reported vascular plant species reported from the ORR listed by state or federal agencies

Species	Habitat on ORR	Legal status ^a	
		Federal	State
Spreading false-foxglove (<i>Aureolaria patula</i>)	River bluff	C2	T
Heavy sedge (<i>Carex grvida</i>)	Varied		S
Hairy sharp-scaled sedge (<i>Carex oxylepis</i> var. <i>pubescens</i> ^b)	Shaded wetlands		S
Appalachian bugbane (<i>Cimicifuga rubifolia</i>)	River slope	C2	T
Pink land's-slipper (<i>Cypripedium acaule</i>)	Dry to rich woods		E-CE
Tall larkspur (<i>Delphinium exaltatum</i>)	Barrens and woods	C2	E
Northern bush-honeysuckle (<i>Diervilla lonicera</i>)	River bluff		T
Branching whitlow-grass (<i>Draba ramosissima</i>)	Limestone cliff		S
Nuttall waterweed (<i>Elodea nuttallii</i>)	Pond, embayment		S
Mountain witch-alder (<i>Fothergilla major</i>)	Woods		T
Golden seal (<i>Hydrastis canadensis</i>)	Rich woods		S, CE
Butternut (<i>Juglans cinerea</i>)	Slope near stream	C2	T
Small-head rush (<i>Juncus brachycephalus</i>)	Open wetland		S
Canada lily (<i>Lilium canadense</i>)	Moist woods		T
Michigan lily (<i>Lilium michiganense</i> ^c)	Moist woods		T
Fen orchid (<i>Liparis loeselii</i>)	Forested wetland		E
Ginseng (<i>Panax quinquefolius</i>)	Rich woods		S, CE
Tubercled rein-orchid (<i>Platanthera flava</i> var. <i>herbiola</i>)	Forested wetland		T
Push's wild-petunia (<i>Ruellia purshiana</i>)	Dry, open woods		S
River bulrush (<i>Scirpus fluviatilis</i>)	Wetland		S
Shinning ladies-tresses (<i>Spiranthes lucida</i>)	Boggy wetland		T
Northern white cedar (<i>Thuja occidentalis</i>)	Rocky river bluffs		S
Three-parted violet (<i>Viola tripartita</i> var. <i>tripartita</i>)	Rocky woods		S

^aC2 = Special concern, under review for federal listing; was listed under the formerly used C2 candidate designation. More information needed to determine status, E = endangered, T = threatened, S = special concern, CE = status due to commercial exploitation.

^b*Carex oxylepis* var. *pubescens* has not been located during recent surveys.

^c*Lilium michiganense* is no longer found on the Oak Ridge Reservation (ORR).

DOE sent a notification letter to FWS on October 2, 2002, informing them of the preparation of this EA Addendum and requesting their recommendations and comments regarding the potential effects of the proposed action. FWS provided a response back to DOE on November 20, 2002, and requested that DOE provide further information on the proposed action and that DOE prepare a BA to assess potential impacts and determine if the action could affect the federally listed gray bat, Indiana bat, and spotfin chub. DOE has completed this BA and submitted it to the FWS. Correspondence from the FWS is included in Appendix C and Appendix D includes a copy of the BA.

The benthic macroinvertebrate community downstream of the main storm drains in Mitchell Branch continues to show impacts when compared with the upstream reference site. However, the taxonomic richness, including the richness of the pollution sensitive taxa (Ephemeroptera, Plecoptera, and Trichoptera), has increased at all sites in Mitchell Branch, and pollution abatement and remediation measures have improved the overall quality of the stream. The fish community of Mitchell Branch is also still showing impacts, but recently collected data also indicate that some recovery is taking place (DOE 2002b).

3.5 SOCIOECONOMICS

The Region of Influence (ROI) for the purpose of this analysis includes Anderson, Knox, Loudon, and Roane counties in Tennessee. These counties are geographically close to ETPP and account for over

90% of DOE-related employment (Table 3.3). This distribution has been relatively stable for the last decade (DOE 2002d).

Table 3.3. Distribution of DOE-related employment by employee residence in 2001

County of residence	DOE-related employees	Percent of total (%)
Anderson	3,547	27.3
Knox	5,019	38.6
Loudon	723	5.6
Roane	2,228	17.1
All other ^a	1,481	11.4
Total	12,842	100.0

^aIncludes more than 16 other counties.

Source: U. S. Department of Energy (DOE) 2002d.

3.5.1 Demographic and Economic Characteristics

Table 3.4 summarizes population, per capita income, and wage and salary employment information from 1995 to 2000. The total population of the ROI was 545,188 in 2000. Knox County accounted for the largest share, with 70% of the regional population. Anderson County accounted for 13% of the regional population, Roane County for 10%, and Loudon County for the remaining 7%. Between 1995 and 2000, the regional population grew an average of less than 1% per year. Loudon County grew the most rapidly (2.0% per year), followed by Roane (0.81%) and Knox (0.72%). Population in Anderson County declined by 0.09% per year over the same period (BEA 2002).

Employment and income for the region from 1995 to 2000 are shown in Table 3.4. Total employment for the region was 364,698 in 2000. Knox County accounted for 75% of that total, followed by Anderson (14%), Roane (7%), and Loudon (4%) counties. Employment for the region grew slowly from 340,422 in 1995 to 364,698 in 2000. It declined in Roane County and grew only slightly in Anderson County, following declines in 1996 and 1997. These declines coincided with major reductions in DOE-related employment during the same period. Per capita income for the region grew by roughly 4% per year, growing fastest in Knox and Loudon Counties. Total personal income grew from \$11.8 billion to \$14.9 billion over the same period (BEA 2002).

Professional and related occupations accounted for 22.0% of the impact region's employment in 2000, while management and business occupations accounted for another 12.5%. Statewide, professional and related occupations represented 17.7% of total employment, and management and business occupations represented 11.8%. Sales and office workers also represented a large fraction of employment (27.7%), as did service workers (14.5%). Professional and management occupations were even more concentrated in the City of Oak Ridge, where professional and related occupations comprised 32.6% of employment, and management and business occupations comprised 14.0% (Census 2000a).

Table 3.4. Demographic and economic characteristics in the Oak Ridge Region of Influence

County	1995	1996	1997	1998	1999	2000	Annual growth 1995–2000 (%)
<i>Anderson</i>							
Population	71,597	71,797	71,736	71,321	71,454	71,269	-0.09
Per capita income (\$)	22,179	22,586	23,392	24,500	24,847	26,032	3.26
Total employment	50,088	48,315	48,109	50,139	50,563	50,984	0.36
<i>Roane</i>							
Population	49,892	50,727	51,179	51,462	51,736	51,943	0.81
Per capita income (\$)	19,166	19,160	19,379	20,116	20,895	22,000	2.80
Total employment	27,670	28,043	25,753	25,541	25,099	24,281	-2.58
<i>Knox</i>							
Population	369,171	373,621	376,767	378,319	380,010	382,723	0.72
Per capita income (\$)	23,059	23,736	24,559	26,092	26,582	28,281	4.17
Total employment	247,713	252,955	257,256	261,899	266,030	273,547	2.00
<i>Loudon</i>							
Population	35,479	36,572	37,427	38,068	38,741	39,253	2.04
Per capita income (\$)	20,540	21,108	22,227	23,301	24,385	26,241	5.02
Total employment	14,951	14,894	15,220	14,982	15,269	15,886	1.22
<i>Region Totals</i>							
Population	526,139	532,717	537,109	539,170	541,941	545,188	0.71
Per capita income (\$)	22,401	22,965	23,748	25,113	25,654	27,242	3.99
Total employment	340,422	344,207	346,338	352,561	356,961	364,698	1.39

Source: Bureau of Economic Analysis 2002.

3.5.2 Distribution of Minority and Economically Disadvantaged Populations

For the purposes of this analysis, a minority population consists of any census tract in which minority representation is greater than the national average of 30.7%. Minorities include individuals classified by the U. S. Bureau of the Census as Black or African-American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, and Hispanic or Latino, and Some Other Race. This provides a conservative estimate consistent with recent Office of Management and Budget guidance (OMB 2000). Hispanics may be of any race and are excluded from the totals for individual races in order to avoid double counting.

The distribution of minority and economically disadvantaged populations changed little between 1990 and 2000. [Figure 3.1](#) shows the distribution of minority populations for the census tracts in and around the Oak Ridge area. As of the 2000 census, minorities represented 40.1% of the population in tract 201. As in 1990, Black or African-American residents comprised the largest group (29.6%). The proportion of minority residents in all other Oak Ridge census tracts was below the national average, ranging from 17.4% in tract 205 to 8.8% in tract 206 (Census 2000a).

According to the 2000 Census, 12.4% of the U. S. population and 13.5% of the Tennessee population had incomes below the poverty level (Census 2000a). In this analysis, a low-income population consists of any census tract in which the proportion of individuals below the poverty level exceeds the national average. Within the ROI, 13.1% of the population in Anderson County had incomes below the poverty level in 1999. The proportion in Knox County was 12.6%, in Loudon County it was 10.0%, and in Roane County it was 13.9%. [Figure 3.2](#) shows the distribution of low-income populations for the census tracts in and around the Oak Ridge area. Within Oak Ridge, low-income populations were located in census tracts 201 (15.8% below poverty level) and 205 (27.9%). In other Oak Ridge census tracts, the percentages ranged from 12.1% in tract 204 to 1.9% in tract 301 (Census 2000a).

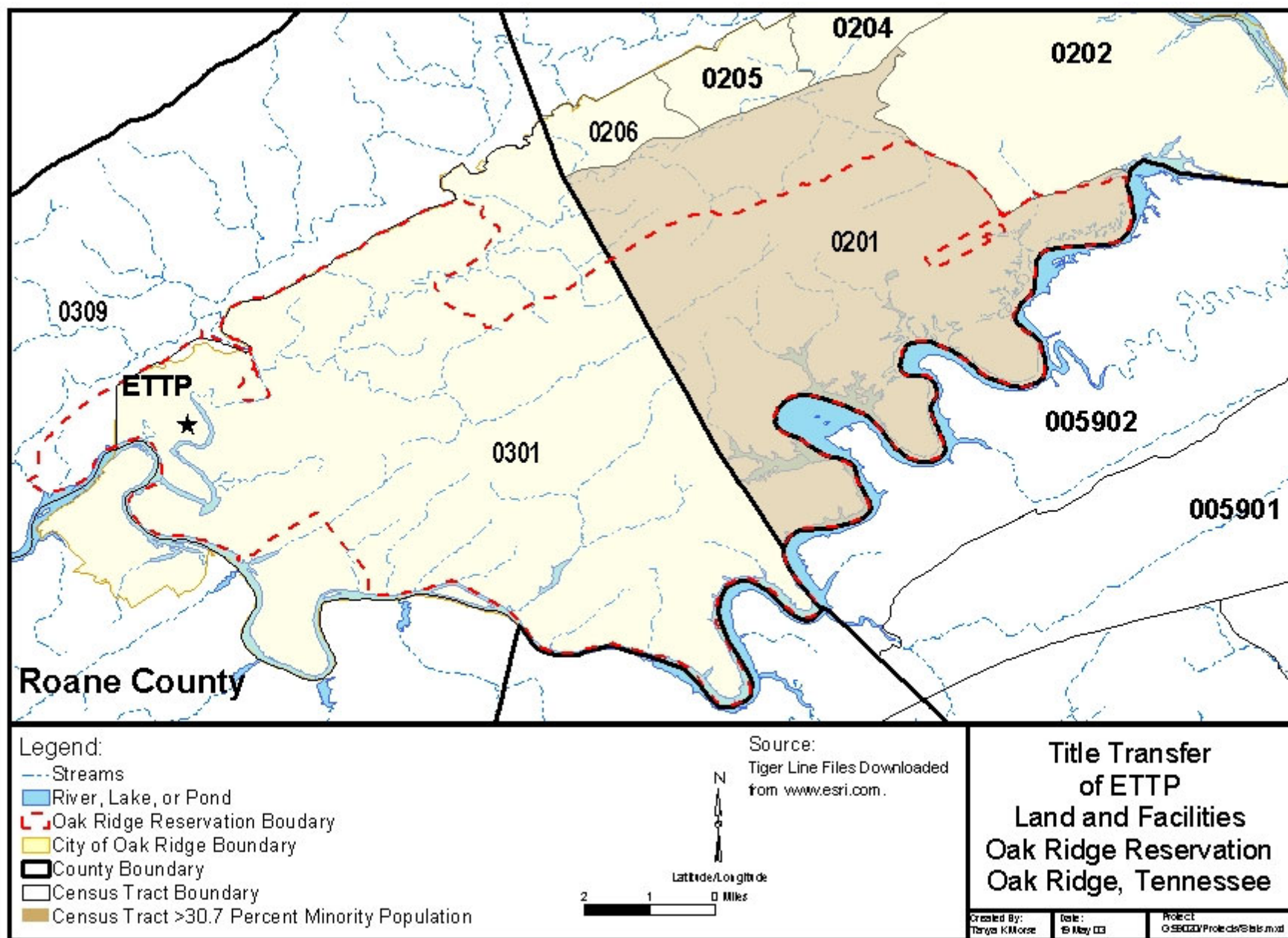


Fig. 3.1. Census tracts with minority population proportions greater than the national average of 30.7%.

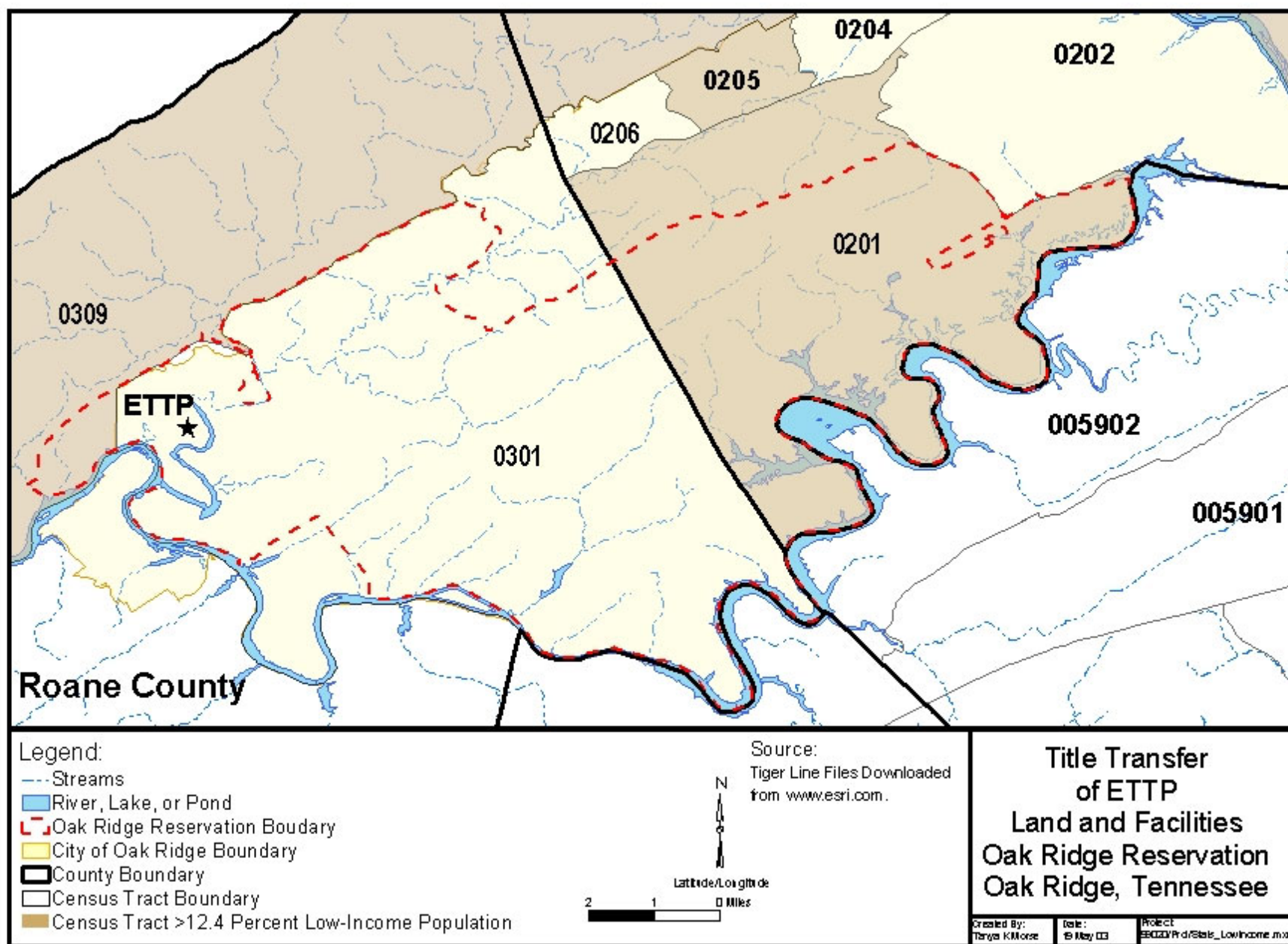


Fig. 3.2. Census tracts with low-income population proportions greater than the national average of 12.4%.

3.5.3 Housing

There were 244,536 housing units in the ROI in 2000, of which 224,796 (91.9%) were occupied and 19,740 (8.1%) were vacant. Of the occupied units, 69.5% were owner-occupied, and 30.5% were renter-occupied. More than half (68.7%) of the vacant units were located in Knox County, 13.5% were in Anderson County, and 11.0% were in Roane County. Loudon County accounted for only 6.8% of the vacant units. In Oak Ridge, there were 13,417 housing units in 2000, of which 12,062 (89.9%) were occupied and 1,355 (10.1%) were vacant. Of the occupied units, 68.4% were owner-occupied and 31.6% were renter-occupied (Census 2000b).

Median housing prices for owner-occupied units ranged from \$86,500 in Roane County to \$98,500 in Knox County. The price asked for vacant-for-sale units was lower in all counties, especially in Roane County, with a median asking price of \$69,900. Oak Ridge prices were similar to those in Knox County, with a median asking price of \$98,200 for owner-occupied units, and a median asking price of \$80,700 for vacant units (Census 2000b).

Among renter-occupied units, the median rent ranged from \$398/month in Roane County to \$493/month in Knox County, as of the 2000 Census. The median rent asked for vacant units similarly ranged from \$335/month in Roane County to \$393/month in Knox County. In Oak Ridge, these figures were \$487/month for occupied units and \$389/month for vacant units (Census 2000b).

3.5.4 Fiscal Characteristics

Oak Ridge City general fund revenues and expenditures for FY 2003 and projected revenues and expenditures for 2004 are presented in [Table 3.5](#). The general fund supports the ongoing operations of local governments, as well as community services, such as police protection and parks and recreation. The largest revenue sources have traditionally been local taxes (which include taxes on property, real estate, hotel/motel receipts, and sales) and intergovernmental transfers from the federal or state government. Local property taxes are expected to account for more than half (60%) of the 2003 general fund revenues (City of Oak Ridge 2003). For FY 2004, the property tax rate is \$2.87 per \$100 of assessed value. The assessment rate for industrial property was 40% (Boyer 2002). The city also receives a payment-in-lieu-of-tax (PILT) for the ORR acreage that falls within the city limits. For FY 2002, the payment was based on a value of \$5,327/acre, and the farmland assessment rate of 25% (DOE 2002e).

Table 3.5. City of Oak Ridge revenues and expenditures, FY 2003 and FY 2004 (\$)

	2003 Actual	2004 Projected
Revenues		
Taxes	19,652,987	20,394,000
Licenses and permits	195,000	215,000
Intergovernmental revenues	10,906,717	11,083,380
Charges for services	1,391,461	1,392,621
Fines and forfeitures	281,400	319,000
Other revenues	447,500	447,500
Total revenues	32,875,065	33,851,501
Expenditures and other financing		
Expenditures	(14,693,586)	(14,833,127)
Other financing uses	(18,670,239)	(19,330,235)
Total expenditures and other financing	(33,363,825)	(34,163,362)

Source: City of Oak Ridge 2003.
FY = Fiscal Year.

3.6 UTILITIES

Since the 1997 EA was completed there have been modifications to some of the existing ETPP utilities in order to extend utility service from ETPP to the Horizon Center. A 12-inch force main sewer line was installed along State Route 58 and Oak Ridge Turnpike, which ties into the existing 15-inch line located south of ETPP. The existing overhead 13.8 kV, 3-phase, dual primary-feed electrical service was extended along State Route 58 and Oak Ridge Turnpike. The line extends approximately 2 miles along the existing transmission line right-of-way to the Horizon Center. Fiber optic telecommunications was extended from the existing ETPP cable tap. Also, work has begun on a new gas and sewer line extension project within ETPP. The proposed gas line will tie into the existing line near the intersection of Contractors Road with State Route 58. One branch of the line will follow Avenue E and provide gas to the K-1007 building and the other will follow Contractors Road and provide service to new facilities in the area northwest of K-1007 (i.e., Parcel ED-5). In addition, a new force main is proposed to tie into the existing sewer system to provide service into Parcel ED-5.